VARAN Manager Board VEB 031

Versatile **A**utomation **R**andom **A**ccess **N**etwork

The VARAN manager board is used to equip all peripheral devices with the VARAN bus as simply as possible. Using the VEB 031 and a minimum of external wiring, the peripheral device is expanded over the PCI bus with 2 VARAN manager interfaces.

Technical Data

Performance data

Internal memory	Serial 16-Mbit Flash	
Interfaces	2 x VARAN (Manager) (maximum length: 100 m)	
	PCI-Bus (32-Bit, 33 MHz)	Vendor ID: 5112 Device ID: 0C00
Connection to peripheral device	Over two 50-pin board-to-board connector slots with 0.8 mm contact spacing (Type: ERNI Microstac, order Nr. 114713)	

Electrical requirements

Internal supply voltage (VDD)	Typically +3,3V DC (±4%) (Provided by the peripheral device over the 50-pin connector slot)
Current consumption of power supply	Typically 400mA Maximum 450mA

Miscellaneous

Article number	16-081-031
Hardware version	1.x

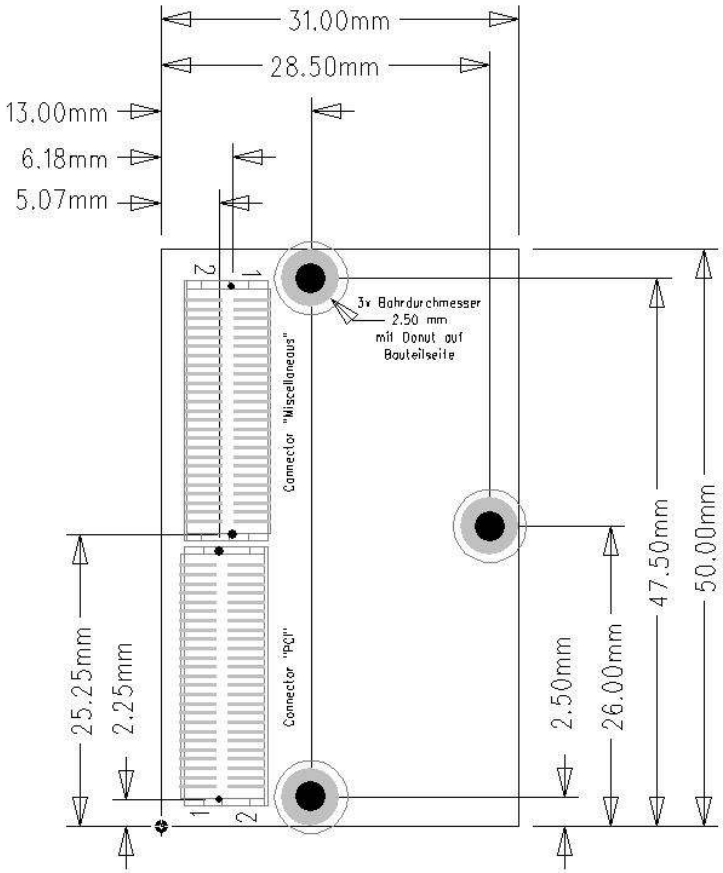
Environmental conditions

Storage temperature	-20 – +85℃	
Operating temperature	0 – 70℃ (according to Compon ent specifications)[1)]	
Humidity	0 – 95%, uncondensed	
EMV Stability	[2)]	
Shock resistance	EN 60068-2-27	150m/s²

[1)] The operating temperature for the entire module must be defined individually for each application, as the operating conditions (mounting location, housing, and heat sources in the vicinity of the module) are not known. The environmental temperature of the VEB must not exceed +70℃.

[2)] The EMV stability must be tested separately in the entire system for each application.

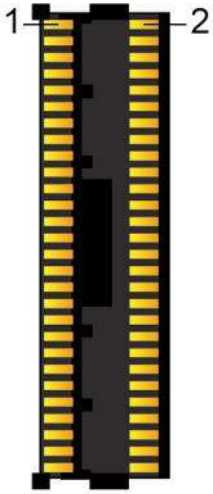
Mechanical Dimensions



The dimensions of the center holes for both 50-pin ERNI board-to-board connectors are applicable with the connector on the periphery board (doesn't show the position of the connection on the VEB 031)

In the above diagram, the VEB 031 is shown from the rear of the connectors.

Connector Layout



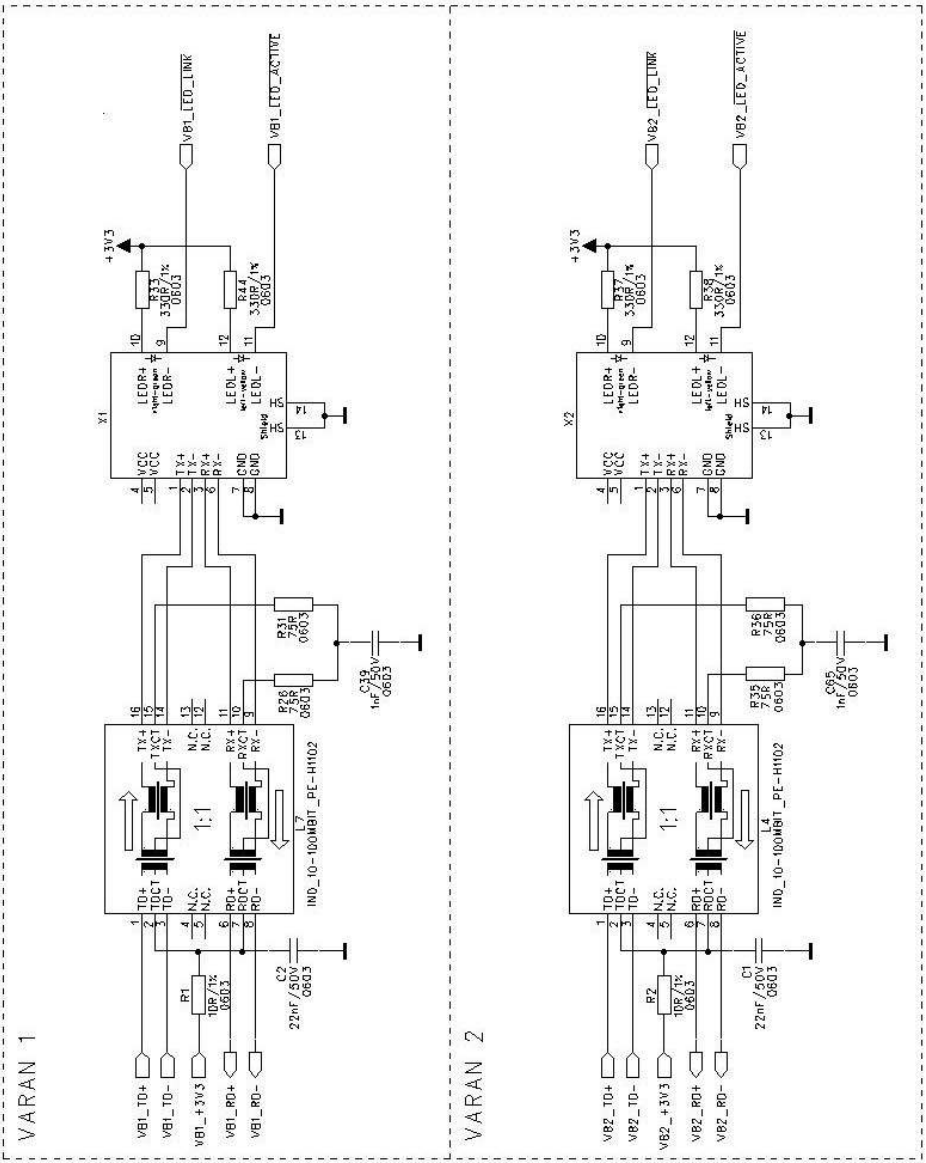
PCI slot	
Pin	**Function**
1	AD30
2	\INTA
3	AD28
4	CLK
5	AD31
6	\SERR
7	AD25
8	AD29
9	AD22
10	AD26
11	AD23
12	AD27
13	AD20
14	AD24
15	AD17
16	\LOCK
17	AD19
18	AD18
19	AD16
20	AD21
21	PAR
22	\CBE3
23	\CBE2
24	IDSEL
25	\IRDY
26	\TRDY
27	\FRAME
28	\CBE1
29	\STOP
30	AD15
31	\PERR
32	\CBE0
33	\DEVSEL
34	AD08
35	AD10
36	AD11
37	AD14
38	AD04
39	AD13
40	AD07
41	AD09
42	AD02
43	AD12
44	AD05
45	AD06
46	AD03
47	GND
48	AD00
49	GND
50	AD01

Miscellaneous connections	
Pin	**Function**
1	+3V3
2	+3V3
3	dnu (JTAG_TCK)
4	not connected
5	dnu (JTAG_TMS)
6	PCI \REQ0
7	not connected
8	reserved (ffu)
9	dnu (+2V5)
10	GND
11	VB2_RD+
12	not connected
13	VB2_RD-
14	VB2_\LED-LINK
15	VB2_+3V3
16	VB2_\LED-ACTIVE
17	not connected
18	reserved (ffu)
19	dnu (+1V2)
20	GND
21	PCI \RES
22	not connected
23	VB2_TD+
24	dnu (SPI_\CS)
25	VB2_TD-
26	dnu (SPI_CLK)
27	not connected
28	reserved (ffu)
29	+3V3
30	GND
31	PCI \GNT0
32	not connected
33	VB1_RD+
34	dnu (SPI_MOSI)
35	VB1_RD-
36	dnu (SPI_MISO)
37	not connected
38	reserved (ffu)
39	+3V3
40	GND
41	VB1_+3V3
42	not connected
43	not connected
44	VB1_\LED-LINK
45	VB1_TD+
46	VB1_\LED-ACTIVE
47	VB1_TD-
48	reserved (ffu)
49	+3V3
50	GND

dnu...do not use

ffu…for future use

Electrical connection



Layout Guidelines

- Place a 100 nF block capacitor on the voltage supply pins (+3.3V) of the board-to-board connector.
- The distance between the carrier (Pulse H1102NLT) and the RJ45 connector must be selected (under 25mm).
- When possible, the distance between the carrier and the VEB 031 „miscellaneous" connector should not exceed 50mm.
- The VARAN differential lines TD+/TD and RD+/RD:
  - Should be as short as possible
  - Parallel (minimum distance between lines)
  - Should have the same length
  - Must be routed
- In addition, the differential lines should have the following properties:
  - Distance between 2 difference line pairs >0,38 mm
  - Distance between the difference lines and the circuit card >25 mm
  - Distance between difference lines and other signals > 0.76 mm
  - Continuous GND surface under the difference lines
  - The difference lines should not be crossed with other signals
  - Difference lines should not be routed under components

More information on the VARAN bus can be found in the VARAN bus specifications!

VARAN Recommended Shielding

The VARAN real-time Ethernet bus system offers robust performance in harsh industrial environments. Through the use of IEEE 802.3 standard Ethernet physics, the potential between an Ethernet line and sending/receiving components is kept separate. The VARAN Manager resends messages to a bus participant immediately when an error occurs. It is principally recommended that the shielding guidelines below be followed.

For applications in which the bus line is run outside the control cabinet, correct shielding is required. This is especially important, if due to physical requirements, the bus lines must be placed next to sources of strong electromagnetic noise. It is recommended that whenever possible, to avoid wiring VARAN-Bus lines parallel to power cables.

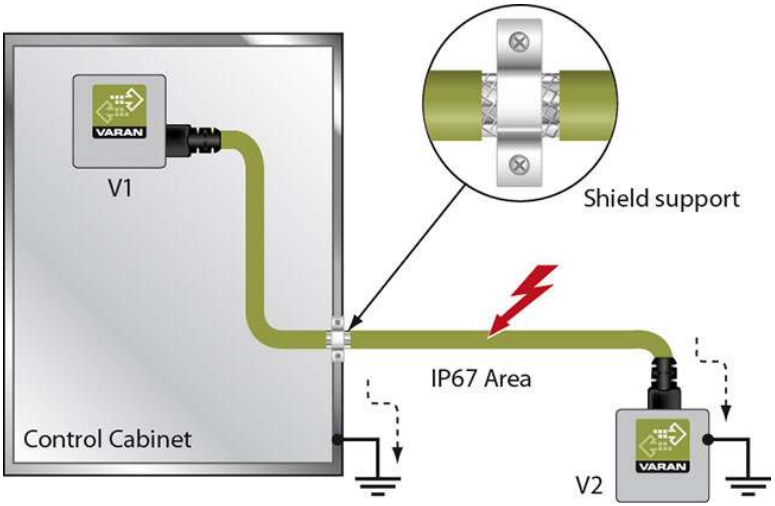
SIGMATEK recommends the use of **CAT5e** industrial Ethernet bus lines.

For the shielding variants, an S-FTP bus line is recommended, which is a symmetric, multiwire cable with unshielded pairs. For the total shielding, a combination of foil and braiding is used; it is recommended that an unvarnished variant be used.

The VARAN cable must be secured at a distance of 20 cm from the connector for protection against vibration!

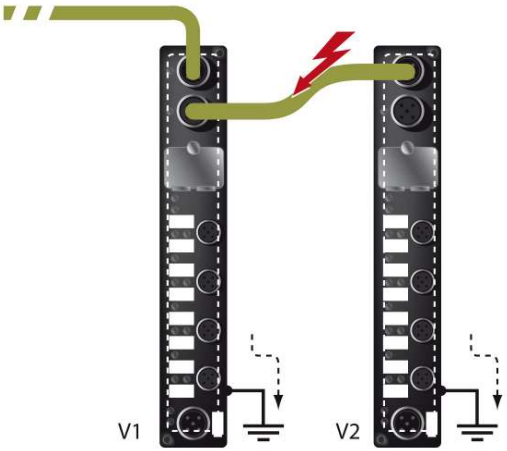
1. Wiring from the Control Cabinet to an External VARAN Component

If the Ethernet lines are connected from a VARAN component to a VARAN node outside the control cabinet, the shielding should be placed at the entry point to the control cabinet housing. All noise can then be deflected from the electronic components before reaching the module.



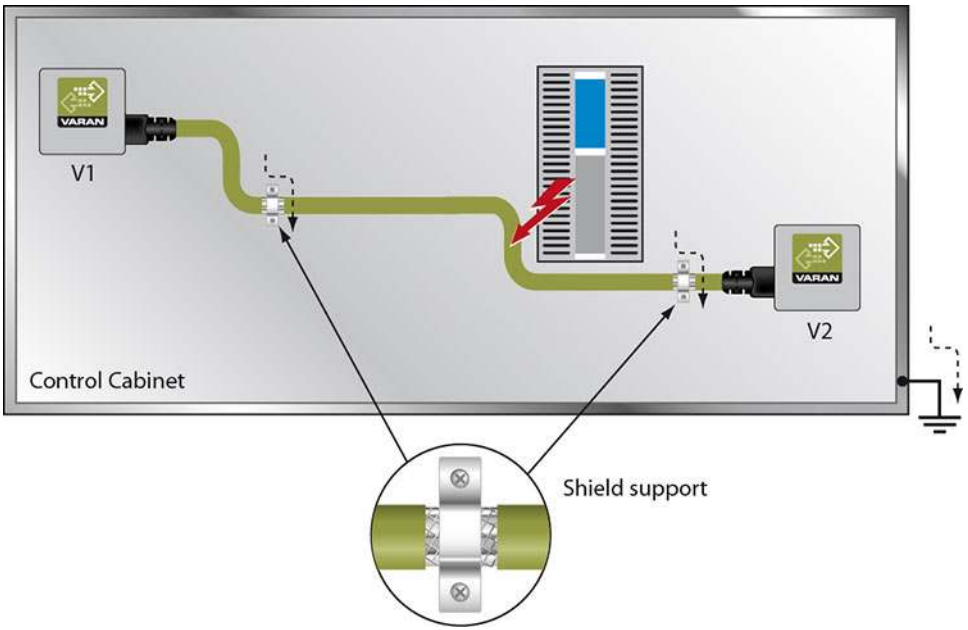
2. Wiring Outside of the Control Cabinet

If a VARAN bus cable must be placed outside of the control cabinet only, no additional shield connection is required. This requires that only IP67 modules and connectors be used. These components are very robust and noise resistant. The shielding for all sockets in IP67 modules are internally connected to common bus or electrically connected to the housing, whereby the deflection of voltage spikes does not flow through the electronics.



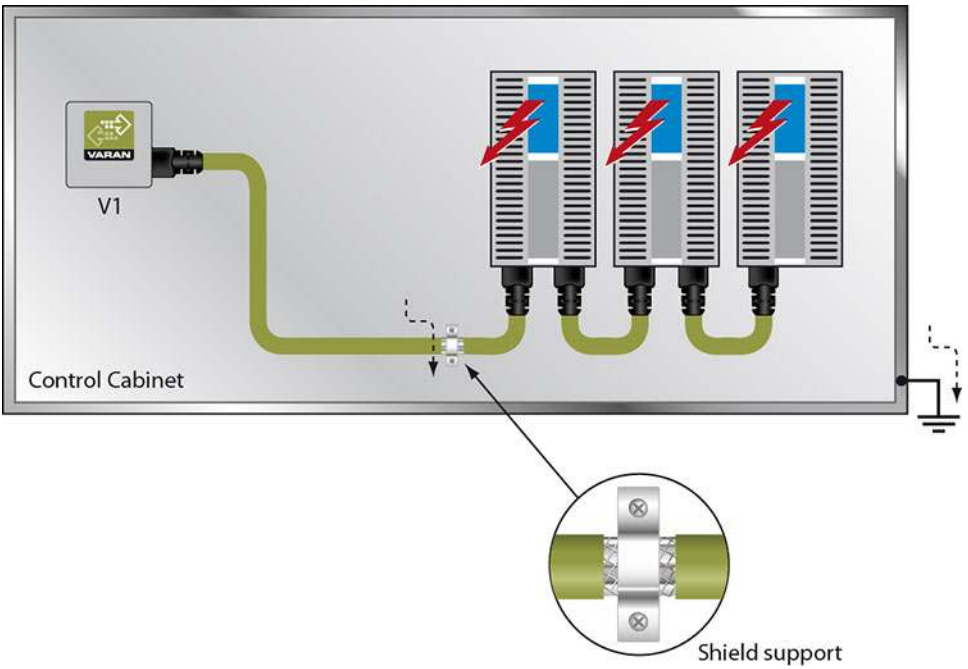
3. Shielding for Wiring Within the Control Cabinet

Sources of strong electromagnetic noise located within the control cabinet (drives, Transformers, etc.) can induce interference in a VARAN bus line. Spike voltages are deflected over the metallic housing of a RJ45 connector. Noise is conducted through the control cabinet housing without further action from the electronic components To eliminate sources of noise during data transfer, it is recommended that the shielding from all electronic components be connected within the control cabinet.



4. Connecting Noise-Generating Components

With the connection of power components that generate strong electromagnetic noise, it is also critical to ensure correct shielding. The shielding should be placed before a power component (or a group thereof).



5. Shielding Between Two Control Cabinets

If two control cabinets must be connected over a VARAN bus, it is recommended that the shielding be located at the entry points to both cabinets. Noise can thereby be kept from reaching the electronics within the control cabinet.